

SUPPORT FOR THE AMENDMENT

This Amendment cancels Claims 5-6, 12-13, 29-30, 38-39 and 42; amends Claims 1, 15-16, 19-20, 40-41; and adds new Claims 43-48. Support for the amendments is found in the specification and claims as originally filed. In particular, support for Claim 1 is implicit in the specification at least at page 9, lines 5-23. Support for Claims 15-16 and 19-20 is found in canceled Claims 5-6 and 12-13, respectively. Support for Claim 40 is found in canceled Claims 5 and 38. Support for Claim 41 is found in canceled Claim 39. Support for Claim 43 is found in the specification at least at page 9, lines 5-23. Support for new Claim 44 is found in the specification at least at page 20, lines 8-11, and page 16, lines 11. Support for new Claim 45 is found in canceled Claim 5. Support for new Claim 46 is found in the specification at page 24, lines 23-24; page 20, lines 8-11, and page 16, lines 11. Support for new Claim 47 is found in the specification at least at page 23, lines 1-2. Support for new Claim 48 is found in canceled Claim 13. No new matter would be introduced by entry of these amendments.

Upon entry of these amendments, Claims 1-4, 7, 9, 11, 14-20, 28, 40-41 and 43-48 will be pending in this application. Claims 1, 15, 16, 19, 20, 40 and 41 are independent.

REQUEST FOR RECONSIDERATION

Applicants respectfully request entry of the foregoing and reexamination and reconsideration of the application, as amended, in light of the remarks that follow.

The present invention provides a polishing liquid composition that, when used to polish a surface comprising an insulating layer and a metal layer, prevents the occurrence of dishing.

Claims 1 and 9 are rejected under 35 U.S.C. § 102(b) over DD 249489A ("Kriltz"). In addition, Claims 2-4, 7 and 11 are rejected under 35 U.S.C. § 103(a) over Kriltz. Kriltz

discloses a polishing composition that can contain diols or triols containing a *maximum of five carbon atoms*. Kriltz at English-language abstract. However, Kriltz fails to suggest the independent Claim 1 limitation of a "polishing liquid composition comprising a compound having *six or more carbon atoms* and a structure in which each of two or more adjacent carbon atoms has a hydroxyl group in a molecule". Thus, the rejections over Kriltz should be withdrawn.

New Claim 43 is also patentably distinguishable over Kriltz, because Kriltz fails to suggest Claim 43's Markush group, the alcohols of which each has *six or more carbon atoms*.

Claims 5, 12, 28-29 and 38-42 are rejected under 35 U.S.C. § 102(b) over U.S. Patent No. 5,783,489 ("Kaufman-489").

Kaufman-489 discloses a chemical mechanical polishing slurry comprising at least two oxidizing agents, an organic acid and an abrasive. Kaufman-489 at abstract.

At the time Kaufman-489 was filed, interconnection layers were mainly of aluminum. Since then, in order to realize Large Scale Integration (LSI), interconnection layers of copper have been developed.

Kaufman-489 discloses a polishing composition for use in polishing a semiconductor substrate having a metal layer mainly containing aluminum (see Kaufman-489 at column 7, lines 41-54) wherein an organic acid, preferably a succinic acid, is used as an agent for preventing the removal of the dielectric layer, i.e., a dishing preventing agent (see Kaufman-489 at column 6, lines 1-14).

In contrast, the present invention relates to polishing of copper and/or copper alloy interconnection layers. Etching of copper is easier than aluminum so that many of the organic acids such as succinic acid, citric acid and malonic acid disclosed in Kaufman-489 as a dishing preventing agent act as an etching agent against copper. For example, when the

composition of Example 2 of Kaufman-489 is applied to the present invention, excessive chemical etching takes place, thereby causing the problem of dishing.

Accordingly, Kaufman-489 would not have considered a metal layer containing copper and/or copper alloy as a subject to be polished. That is, Kaufman-489 fails to disclose polishing a metal layer containing copper and/or copper alloy which enables by an improved polishing rate and the prevention of dishing.

The present invention was achieved by finding that both effects of improving polishing rate and preventing dishing can be exhibited only in combining specific organic acid(s) as an etching agent and other specific organic acid(s) as a dishing preventing agent. That is, the present invention relates to a specific combination of organic acids. In contrast, Kaufman-489 fails to suggest any specific combination of organic acids.

Thus, the rejection over Kaufman-489 should be withdrawn.

Claim 6 is rejected under 35 U.S.C. § 102(b) over U.S. Patent No. 5,209,820 ("Tytgat"). In addition, Claims 13 and 30 are rejected under 35 U.S.C. § 103(a) over Tytgat in view of U.S. Patent No. 6,447,563 ("Mahulikar").

Tytgat discloses baths for the chemical polishing of stainless steel surfaces by immersion. Tytgat's immersion baths comprise a mixture of hydrochloric acid, nitric acid and phosphoric acid, a substituted or unsubstituted hydroxybenzoic acid and an amine in aqueous solution.

Tytgat's polishing in immersion baths is quite different than the polishing by an abrasive of the present invention (see, e.g., Claim 48).

Furthermore, since the present invention relates to polishing of metal layers containing copper and/or copper alloy, an amine containing large alkyl groups having 4 or more carbon atoms is required in order to absorb onto copper. Tytgat fails to suggest this feature of the present invention.

Mahulikar discloses a CMP slurry system that comprises two parts, the first part containing an abrasive. Mahulikar at abstract.

There is no motivation to combine Mahulikar with Tytgat because the polishing with an abrasive of Mahulikar is quite different than the chemical polishing by immersion of Tytgat.

Thus, the rejections over Tytgat and over Tytgat in view of Mahulikar should be withdrawn.

In view of the foregoing amendments and remarks, Applicants respectfully submit that the application is in condition for allowance. Applicants respectfully request favorable consideration and prompt allowance of the application.

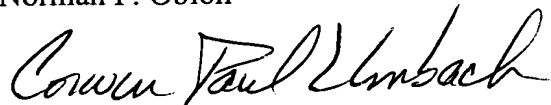
Should the Examiner believe that anything further is necessary in order to place the application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned attorney at the telephone number listed below.

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